BANK OF CANADA
BANQUE DU CANADA

Discussion Paper/Document d'analyse
2013-3

Sovereign Default and State-Contingent Debt

by Martin Brooke, Rhys Mendes, Alex Pienkowski and Eric Santor

This paper is a joint study with the Bank of England

www.bank-banque-canada.ca

Bank of Canada Discussion Paper 2013-3

November 2013

Sovereign Default and State-Contingent Debt

by

Martin Brooke, Rhys Mendes, Alex Pienkowski and Eric Santor

martin.brooke@bankofengland.co.uk
Financial Stability, Bank of England, Threadneedle Street, London, EC2R 8AH

rmendes@bankofcanada.ca
Bank of Canada, Ottawa, Ontario K1A 0G9

alex.pienkowski@bankofengland.co.uk
Monetary Analysis, Bank of England, Threadneedle Street, London, EC2R 8AH

esantor@bankofcanada.ca
Bank of Canada, Ottawa, Ontario K1A 0G9

Bank of Canada discussion papers are completed research studies on a wide variety of technical subjects relevant to central bank policy. The views expressed in this paper are those of the authors.
No responsibility for them should be attributed to the Bank of England or the Bank of Canada.

ISSN 1914-0568

© 2013 Bank of Canada

Foreword

The Latin American debt crises in the 1980s and the Asian crisis in the late 1990s both provided impetus for reforming the framework for restructuring sovereign debt. In the late 1980s, the Brady plan established the importance of substantive debt relief in addressing some crises. A decade later, as the Asian crisis faded, the G10 and major emerging market economies worked together to increase the flexibility of IMF lending and promoted the wider use of collective action clauses in foreign law bonds.

More recently, the banking crisis of 2008-09 has led to the implementation of an ambitious financial sector reform agenda to reduce the risk of such a crisis occurring again. But reforms to reduce the incidence and cost of sovereign debt crises, such as those experienced in the euro area, have proceeded more slowly.

The international community has a role to play in addressing this gap. In that regard, this paper is intended to stimulate debate on the problems in the current practices for sovereign debt restructuring and puts forward some proposals to improve the functioning of sovereign debt markets.

The Bank of Canada and the Bank of England have collaborated on these issues in the past. For example, in 2001, Andy Haldane and Mark Kruger authored a joint paper on how to resolve sovereign debt crises in a more orderly and transparent manner. This current work builds on those ideas by exploring how state-contingent debt could further improve the system.

Charlie Bean/John Murray

London/Ottawa November 2013

JEL classification: F34
Bank classification: International topics; International financial markets

Avant-propos

Les crises de la dette survenues en Amérique latine dans les années 1980 et la crise asiatique de la fin des années 1990 ont donné l'impulsion à des réformes du cadre de restructuration des dettes souveraines. À la fin des années 1980, le plan Brady a mis en lumière l'importance d'un allégement substantiel de la dette pour résoudre certaines crises. Dix ans après, une fois la crise asiatique apaisée, les pays du G10 et les grands pays émergents ont joint leurs efforts pour accroître la flexibilité des programmes de prêt du FMI et encouragé l'insertion plus systématique de clauses d'action collective dans les contrats d'émission d'obligations de droit étranger.

Plus récemment, la crise bancaire de 2008-2009 a conduit à la mise en œuvre d'un programme ambitieux de réforme du secteur financier visant à atténuer le risque qu'une telle crise se répète. Mais les réformes destinées à réduire la fréquence et le coût des crises des dettes souveraines – comme celles qu'a affrontées la zone euro – ont progressé à pas plus lents.

La communauté internationale a un rôle à jouer pour combler cette lacune. À cet égard, le présent document a pour objet de stimuler le débat sur les problèmes que soulèvent les pratiques actuelles de restructuration des dettes souveraines et formule des propositions en vue d'améliorer le fonctionnement des marchés des titres souverains.

La Banque du Canada et la Banque d'Angleterre ont collaboré à l'analyse de ces questions dans le passé. Ainsi, en 2001, Andy Haldane et Mark Kruger ont corédigé une étude sur les moyens de résoudre les crises des dettes souveraines de manière plus ordonnée et plus transparente. Le travail qui suit continue dans cette voie en examinant comment l'émission d'obligations conditionnelles pourrait renforcer davantage encore le système.

Charlie Bean / John Murray

Londres / Ottawa Novembre 2013

Classification JEL : F34
Classification de la Banque : Questions internationales; Marchés financiers internationaux

Summary

In recent decades, the common perception had been that sovereign debt crises were unlikely to occur in advanced economies. Events in the euro area over the past few years, however, have undermined this view.

The sovereign debt restructuring in Greece and the events surrounding the IMF-EU support packages for Ireland, Portugal and Cyprus have exposed fault lines in the existing practices for sovereign debt crisis resolution – perhaps most importantly, an overreliance on official sector liquidity support. This paper argues that the current approach is suboptimal for five main reasons: i) it increases the risk of moral hazard; ii) it incentivises short-term lending, which can increase the risk of liquidity crises; iii) it puts an inequitable amount of taxpayer resources at risk; iv) substantial official sector holdings of an insolvent sovereign's debt can complicate negotiated debt writedowns; and, v) it can delay necessary reforms, thereby requiring larger policy adjustments to be implemented when action is eventually taken.

In response to these deficiencies, this paper argues that, for reasons of equity and efficiency, private creditors should play a greater role in risk-sharing and helping to resolve sovereign debt crises. We propose the introduction of two complementary types of state-contingent bonds – 'sovereign cocos' and 'GDP-linked bonds'.

Sovereign cocos are bonds that would automatically extend in repayment maturity when a country receives official sector emergency liquidity assistance. This predictable and transparent means of bailing-in creditors would increase market discipline on sovereigns to prudently manage their debt, *ex ante*, thus reducing the incidence of crises. And, it would reduce the size of official sector support packages once a crisis has hit, as amortising debt would no longer need to be covered by program financing.

GDP-linked bonds are debt instruments that directly link principal and interest payments to the level of a country's nominal GDP. They provide a natural complement to sovereign cocos. While sovereign cocos are primarily designed to tackle liquidity crises, GDP-linked bonds help reduce the likelihood of solvency crises. This is because GDP-linked bonds provide a form of 'recession insurance' that reduces principal and interest payments when a country is hit by a negative growth shock. This helps to both stabilise the debt-to-GDP ratio and increase a sovereign's capacity to borrow at sustainable interest rates. While all countries might experience some benefit from the use of GDP-linked debt, economies with higher GDP growth volatility (such as emerging market economies) or countries where monetary policy is constrained (such as those in a monetary union) are likely to benefit most.

The promotion of collective action clauses (CACs) by the G10 and the major emerging market economies in the mid-2000s provides evidence that it is possible for the international community to reach agreement on, and implement, changes to the contractual terms of sovereign debt. This experience suggests that it would be possible to implement the two types of state-contingent bonds proposed in this paper.

1. Introduction

For the better part of the past six decades, sovereign default has been widely viewed as an emerging market economy (EME) phenomenon. Recent events, however, have changed this perception. In April 2012, the Greek government restructured €200 billion of its sovereign debt, imposing net present value (NPV) losses of 59–65% on its creditors (Zettelmeyer, Trebesch and Gulati 2013). At the same time, market participants have been pricing in material default probabilities for some advanced economies' sovereign debt.

The risk of sovereign default in advanced economies is a key issue confronting policy-makers. History has shown that sovereign defaults tend to be clustered (**Chart 1**). Moreover, the financing requirements of advanced economy sovereigns are also comparatively very large. Advanced economy gross financing needs for 2013 are expected to average 22.7% of GDP (US$9.9 trillion in total), while for major EMEs, the equivalent is only 8.8% of GDP (US$2 trillion) (IMF 2013a).

Furthermore, the potential for adverse contagion effects is likely to be greater for an advanced economy sovereign default, due to the more complex web of financial linkages. Cross-border assets in the euro area increased from around 75% of combined GDP in 1991 to over 300% in 2007, compared to only 36% of GDP in Latin America in 2007.[1]

Given the above considerations, the current crisis prevention and resolution framework deserves to be reviewed.

In past episodes in which sovereigns have lost access to private capital markets, the typical response of the international community has been to provide official sector liquidity support. This has happened even when there were significant doubts about sovereign solvency. This approach, however, has not always been effective. In the case of Greece, the IMF's Exceptional Access Criteria were changed to allow lending even when Fund staff did not consider it a high probability that the member's public debt was sustainable. This led to an extended period of market disruption and heightened uncertainty both in Greece and the euro area.

More broadly, the IMF (2013b) finds that debt restructurings, when they occur, have 'often been too little and too late' and often failed to 're-establish debt sustainability and market access in a durable way'. Moreover, the uncertainty associated with this delay prolongs financial instability and weakens growth due to debt overhangs.

Reflecting on these lessons, this paper considers the main fault lines in the existing toolkit for preventing and resolving sovereign debt crises, and suggests how sovereign state-contingent bonds would help to mitigate them.

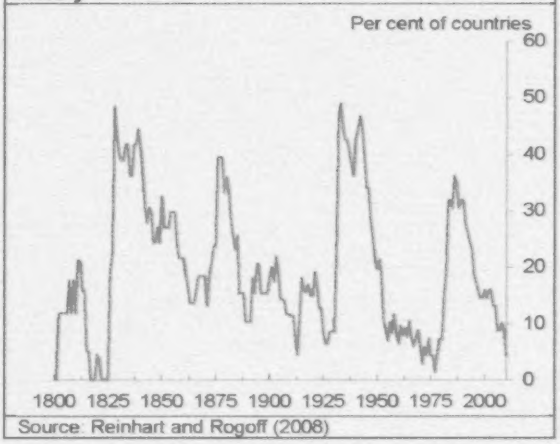
Specifically, we propose the introduction of two complementary types of state-contingent bonds – sovereign cocos and GDP-linked bonds. The aim is to ensure that private creditors play a greater role in risk-sharing and helping to resolve sovereign debt crises. In this way, these types of bonds will improve the efficiency and equity of sovereign debt markets.

The policy options outlined in this paper are not intended to tackle the ongoing sovereign debt problems in the euro area. Rather, by identifying the main deficiencies in current practices, the policies proposed here could help prevent and/or reduce the cost of *future* crises.

The paper is organised as follows. Section 2 reviews the current way in which sovereign debt crises are tackled, and sets out where we see the major fault lines. In particular, it considers the risks from an overreliance on official sector liquidity support.

Sections 3 and 4 introduce two state-contingent bonds – sovereign contingent convertible (coco) bonds and GDP-linked bonds – designed to improve crisis resolution and prevention. Section 5 argues that international coordination will be an important factor in driving the adoption of these instruments. Section 6 concludes.

Chart 1: Sovereign external debt restructuring through history



Source: Reinhart and Rogoff (2008)

[1] Updated and extended version of Lane and Milesi-Ferretti (2007) dataset.

2. Current practices for sovereign debt restructuring

As of end-2012, the total stock of global sovereign debt was around US$60 trillion. Of this, around 95% was judged by Standard and Poor's to be 'investment grade' ('BBB' or above). The implied historical probability of default of the most risky category of this debt – 'BBB'-rated bonds – is only 3.6% over five years (Standard and Poor's 2013). However, when defaults do occur there has been a wide dispersion of outcomes for creditors; and in some cases the size of NPV losses to creditors has been high (**Table 1**). This is especially the case when the face value of debt has been written down.

Table 1: Haircut by type of restructuring (%) – 1970–2010

	Mean	Standard deviation	Min	Max
Average loss				
NPV reduction	37.0	27.3	-9.8	97.0
Reduction in face value	16.8	30.6	0.0	97.0
Rescheduling versus debt reduction				
Rescheduling only	24.2	16.7	-9.8	73.2
With reduction in face value	64.8	24.9	-8.3	97
Pre-emptive versus post-default				
Pre-emptive restructuring	24.3	21.8	-9.8	90.0
Post-default restructuring	45.3	27.4	-4.6	97.0

Note: All haircuts are in NPV terms except for the 'face value reduction' row.
Source: Cruces and Trebesch (2013)

Sovereign debt crises tend to be associated with currency and/or banking crises, making them very costly. De Paoli, Hoggarth and Saporta (2009) estimate that sovereign debt crises in EMEs have led to median output losses – relative to the counterfactual – of at least 5% in levels terms. Furthermore, these periods of below-potential growth have been persistent, lasting on average for around 8–11 years. Sovereign defaults also have high spillover costs to other countries via financial and trade links.

So why are sovereign defaults so disorderly and costly? Sovereign debt has a number of inherent differences to private sector debt which can complicate restructurings. These include: i) limits on the available legal remedies to enforce payment, including the inability of creditors to force the liquidation of a sovereign's domestic assets; ii) constraints on the ability of a sovereign to credibly pledge collateral; iii) the large size of individual sovereign debt stocks, which makes effective default hedging difficult; and iv) the importance of sovereign debt in the operations of financial markets.

The inefficiency of sovereign debt restructurings is compounded by one of the main fault lines in the current regime for sovereign debt crisis prevention and resolution – the overreliance on the provision of liquidity support by the international official sector. This overreliance is suboptimal for five interrelated reasons.

i. Moral hazard

Creditor and debtor moral hazard problems can arise if there is an expectation of official sector bailouts. While there are often good reasons for such support, it can have the adverse consequence of encouraging excessive risk-taking by the sovereign borrower and its private sector creditors (since agents anticipate support if downside risks were to materialise).

The evidence on whether official sector lending promotes moral hazard is mixed, partly because capturing this risk empirically is difficult. Haldane and Scheibe (2004), Gai and Taylor (2004) and Dreher (2004) find evidence of creditor and debtor moral hazard associated with IMF lending. However, the IMF (2007) concludes that there was little evidence of moral hazard associated with its lending. Corsetti, Guimaraes and Roubini (2003) argue that liquidity support can incentivise debtor countries to undertake desirable but costly reform policies, since it reduces the negative impact of policies such as fiscal consolidation.

Chart 2 shows that over the past two decades IMF lending as a proportion of borrowing country GDP has tended to increase.[2] While the evidence on moral hazard is not definitive, it is likely that the risk of moral hazard increases as the expected size of official sector support packages rises. This is because when bailout packages cover a significant proportion of the sovereign's debt and the sovereign is faced with a solvency problem, it is more likely that official creditors will need to take NPV losses in order to help restore debt sustainability. This potential transfer of resources from official to private sector borrowers distorts the *ex-ante* incentives for creditors to lend (Mussa 1999, 2004).

[2] For the euro-area programme countries, Chart 2 does not include loans from the EU. Including this would bring programme size as a proportion of GDP to: Greece (first programme) – 49%; Ireland – 60%; Portugal – 68%; and Greece (second programme) – 85%.

ii. Incentivises short-term lending

Liquidity support can also incentivise excessive short-term lending. If creditors anticipate official sector financial support to a sovereign (even when solvency is uncertain), then they will have a strong expectation that debt amortising during the support programme will be repaid in full. This leaves longer-term creditors bearing the burden of any future debt restructurings. The *ex-ante* incentive, therefore, is to lend at short maturities, as the probability of full repayment is increased by the anticipation of official sector support.

In recent years, there has been evidence of this distortion in euro-area programme countries. **Chart 3** shows the spreads of sovereign debt in Greece, Ireland and Portugal (over German bunds) before the crisis and immediately following IMF Board approval of their support packages. It is clear that the yield curve became much steeper over short maturities. One interpretation of this is that markets had a higher expectation of full repayment during the IMF/EU programme, but a lower expectation of repayment thereafter.

We can also see evidence of this effect when we examine debt issuance. **Chart 4** shows that during Spain's period of heightened market tension – in the second half of 2011 and the first half of 2012 – the maturity of its debt issuance declined significantly.

The incentive for private creditors is to lend at short maturities as this debt has a much higher probability of being paid in full than longer-maturity debt. But by reducing the average maturity of the sovereign's debt, this can increase the likelihood of a liquidity crisis occurring in the first place (Cole and Kehoe 2000).

iii. Taxpayer resources are put at risk

Since the beginning of the euro-area crisis, over €600 billion of official sector support has been disbursed or committed (excluding ECB liquidity support to banks).[3] This represents over 6% of euro-area GDP.

These support packages have, therefore, put large amounts of public resources at risk and raise questions about the fair burden-sharing of losses incurred by private sector creditors.

[3] This includes around €165 billion for the two Greek packages; the €80 billion package to Portugal; €70 billion to Ireland; the €100 billion envelope of resources available to recapitalise Spanish banks; €10 billion to Cyprus; and €195 billion in ECB SMP purchases.

iv. Writedowns are harder to negotiate

The experience in the euro area has demonstrated that it can be difficult to achieve sustainable debt levels via negotiated debt writedowns with private creditors when a significant proportion of a sovereign's debt is held by the official sector. This is because sovereign debt held by the official sector often has *de-facto* senior creditor status, which effectively subordinates existing private sector debt.

Therefore, in order to reduce a sovereign's debt to a sustainable level, the implied haircut on the remaining private sector creditors must be increased. But this has the effect of making it harder to agree to a *voluntary* debt restructuring, increasing the risk of a messy unilateral default or haircuts being applied to the official sector liquidity support loans.

When the solvency of a sovereign is uncertain, there may be a tipping point in regard to official sector lending. Relatively small amounts of liquidity support can play a catalytic role, helping to coordinate investors to rollover debt and providing breathing space for the sovereign to enact reforms. But when official sector support increases beyond a certain point, this subordination effect kicks in, making it harder to attract new finance (Ghezzi 2012).

The official sector may also be less likely to sanction a debt restructuring if there is a risk that its emergency liquidity support may also be included in the writedown.

v. 'Gambling for redemption'

The prospect of generous official sector liquidity support has the potential to delay economically necessary but politically difficult decisions in the hope that circumstances might improve. In particular, domestic policy-makers may 'gamble for redemption' by delaying the decision to seek a debt restructuring. However, an early and perhaps relatively small debt restructuring may be in the best interest of the country, and even creditors. Therefore, the current approach can lead to a situation in which debt writedowns are 'too little and too late' (IMF 2013b).

Given the problems identified above, an extreme solution might be to abolish official sector support altogether (Schwartz 1998). This would mean that debtors and creditors would be forced to resolve payment difficulties on a bilateral basis, without official sector intervention.

However, this response ignores many of the benefits associated with official sector liquidity support. In times of crisis, when market liquidity is low and risk aversion is high, liquidity runs can cause long-term solvency problems. Having a backstop – such as the IMF; regional facilities like the European Stability Mechanism; or central bank intervention – can help to resolve liquidity crises before they become solvency crises.

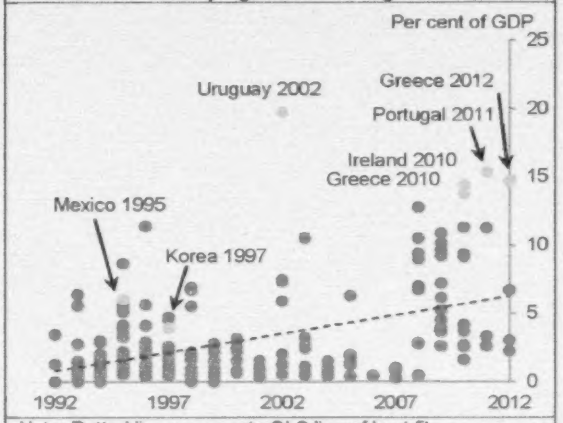
A government's solvency depends on future economic growth, interest rates and its capacity to generate a sufficiently large primary balance. As a result, it is often difficult to determine, ex ante, whether a sovereign has the capacity to repay its debts. This suggests that an appropriate policy response to sovereign debt crises should not rely on the need to immediately distinguish between liquidity and solvency crises.

The policy proposals in this paper seek to chart a middle course – maintaining the role of official sector assistance, but hard-wiring in greater involvement from private creditors in crisis resolution. The proposals would also help to avoid the need to make politically and economically difficult decisions on debt restructuring at the height of a crisis. These reforms are designed to parallel the ongoing reforms being undertaken to promote greater private sector burden-sharing in the event of bank resolution (Box 1).

Greater private sector involvement in sovereign debt restructuring could be achieved through two approaches: a statutory response or a contractual response.

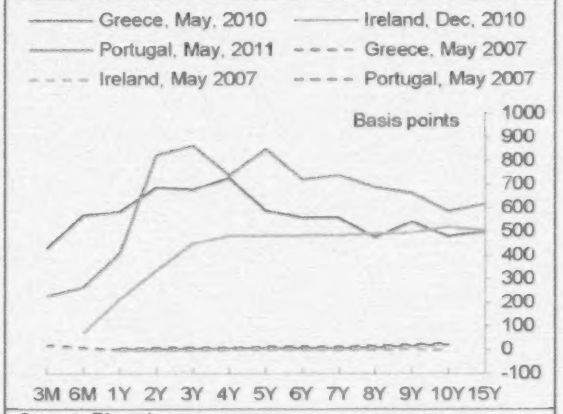
Statutory approaches toward improving sovereign debt restructuring arrangements have been considered in the past, but never implemented. The most high profile example was the Sovereign Debt Restructuring Mechanism (SDRM) proposal discussed a decade ago (Krueger 2002). Ideas related to the SDRM, but less ambitious in scope, are currently receiving some renewed attention. For instance, there has been some discussion recently of a non-statutory sovereign debt arbitration body designed to facilitate debt negotiations (Gitlin and House 2013). And, the Committee on International Economic Policy and Reform (2013) have put forward a

Chart 2: Size of IMF programmes through time



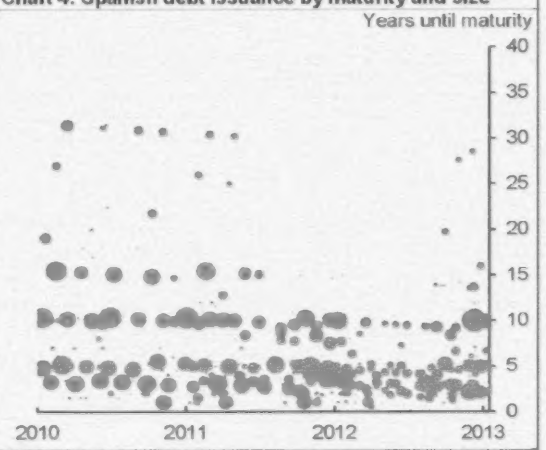
Note: Dotted line represents OLS line of best fit.
Source: IMF MONA database

Chart 3: Sovereign spreads over German bunds



Source: Bloomberg

Chart 4: Spanish debt issuance by maturity and size



Note: Bubble size represents size of issuance. Excludes Treasury bills.
Sources: Dealogic and Bank calculations

proposal for the IMF to create a sovereign debt adjustment facility.

This paper focuses on how contractual reforms to sovereign debt contracts could improve crisis prevention and resolution – in particular, how sovereign bonds can be made more state-contingent in order to increase risk-sharing with private sector creditors. This risk-sharing would be defined, *ex ante*, in the clauses and conditions of the sovereign bond, thereby improving the predictability around burden-sharing and allowing markets to incorporate these risk-sharing elements into the price of the debt.

At present, most sovereign bonds are only state-contingent in the sense that governments can either choose to pay in full or seek to restructure their debt obligations. This binary decision can have significant costs and benefits on each side. For instance, a debt writedown will help tackle debt overhang problems, but can prevent future market access for a prolonged period and can severely damage the domestic economy. Given the uncertainty and spillover costs associated with debt restructuring, significant gains could be realised by both the debtor and creditors from a more predictable and orderly system.

This paper will focus on how two state-contingent debt contracts – sovereign cocos and GDP-linked bonds – can improve the functioning of sovereign debt markets and the resolution of crises.

Box 1: Parallels with the Banking Crisis

This box considers the significant differences in the policy responses over the period 2007–12, to the 'too-big-to-fail' problem in banks and the sovereign debt crisis in the euro area.

Following the collapse of Lehman Brothers in September 2008, banks in many jurisdictions received significant liquidity support, and in some cases capital support, from their respective national authorities. The crisis exposed significant structural failings in the global banking system. Perhaps the biggest of these is the 'too-important-to-fail' problem: the size, interconnectedness and complexity of global banks meant that in some cases bank failure would likely have systemic consequences and, thereby, entail material impacts on the provision of financial services and on economic activity. This meant that there was an implicit guarantee that the domestic authorities would bail out these banks if they ever got into difficulty, in order to avoid these costs.

This implicit guarantee was recognised by the banks and their private sector creditors, which led to an underpricing of risk and excessive risk-taking. Given the presumption that authorities would bail out systemically important firms, there was a perverse incentive for banks to increase their leverage and complexity, which further compounded the problem (Haldane and Alessandri 2010).

Some parallels can be drawn with sovereigns, especially those in advanced economies. The level of outstanding government debt in many of these countries is so large that default would have significant repercussions on domestic financial markets. And financial globalisation, especially in regions such as the euro area, has generated a complex network of trade and financial interlinkages which can act to propagate and significantly amplify shocks both domestically and internationally.

In the euro area, risks have been compounded by the possibility that a country experiencing sovereign and banking crises might decide to exit the European Monetary Union. Faced with the threat of possible widespread contagion within the euro area, even sovereign debt problems in small countries such as Greece, Ireland and Portugal have been deemed systemically important.

Creditors, and perhaps some sovereigns, therefore anticipated official sector support in the event of any sovereign distress, blunting market discipline and encouraging excessive risk-taking.

Despite these apparent similarities, the policy response to tackle the 'too-important-to-fail' problem for banks and sovereigns has been quite different. Learning the lessons from the crisis experience, on the banking side there is now a global resolve to eliminate the 'too-big-to-fail' problem and ensure that all firms could be resolved, if need be. In the case of such resolutions, there is a presumption that private creditors (consistent with the agreed creditor hierarchy of secured and unsecured claims) will be bailed-in when solvency problems materialise, thus reducing the risk of future taxpayer bailouts.

Examples of such reforms being undertaken or considered include:

i) the introduction of special bank resolution regimes to speed up and simplify bank restructuring;

ii) initiatives to improve information sharing and coordination to improve cross-border bank resolution;

iii) the requirement for banks to prepare 'recovery and resolution plans' to provide a road map for private sector bail-in; and

iv) the development of coco bonds for banks to make bail-in more automatic (see Murphy, Walsh and Willison 2012).

For both banks and sovereigns, the initial response was rightly to provide liquidity support. There has, however, been little discussion about reforms to the practices for sovereign debt restructuring that might reduce the likelihood of future bailouts. Rather, the main focus has been on acting to increase the size of official sector resources available for crisis resolution liquidity support (e.g., at the IMF and in the European Stability Mechanism).

3. Sovereign cocos

The first of the two state-contingent bond contracts that we will consider is 'sovereign cocos'. This idea was advocated by Weber, Ulbrich and Wendorff (2011) in the context of euro-area bonds. In this paper, we use the term 'sovereign cocos' to define a bond which automatically extends in repayment maturity when a country receives official sector emergency liquidity assistance.

The details of this automatic private sector bail-in would be defined *ex ante* in the bond's legal documentation. Activation of the maturity extension would not require approval by the existing bondholders. If the entire debt stock of a country were to contain these clauses, the entire amortisation profile of the sovereign would shift into the future when a crisis occurred and official sector assistance was provided.

Variants of this idea exist. Barkbu, Eichengreen and Mody (2011) and Mody (2013), respectively, consider state-contingent bonds in which face value haircuts and automatic maturity extensions are triggered when pre-defined debt-to-GDP ratio thresholds are breached. Similarly, the French Development Agency has issued concessional loans to some West African sovereigns that include an automatic maturity extension if export revenues fall below a pre-defined level (AFD 2009). Box 2 considers *ex-post* debt maturity extensions, negotiated after a crisis hits a sovereign.

Clearly there are numerous ways in which sovereign cocos could be designed. In the context of contingent convertibles (cocos) issued by banks, we are already seeing variations in the contractual terms adopted. Further work on the optimal form of sovereign bond coco terms would be needed if this idea is to be advanced. In principle, it would be possible to tailor the terms to specific circumstances of individual countries. The lessons from Collective Action Clauses[4] (CACs), however, suggest there will likely be advantages in standardising on a commonly agreed best practice.

For illustrative purposes, this note will focus on one design, outlined in Table 2.

Table 2: Proposed design features of a sovereign coco

Feature	Design
Trigger for maturity extension	The maturity extension clause would be activated when the sovereign receives emergency liquidity from the official sector. In practice, this will be when the sovereign draws upon credit from the IMF or another bilateral/regional facility (such as the European Stability Mechanism and other similar initiatives).
Length of maturity extension	The maturity extension needs to be long enough to overcome the sovereign's liquidity problems (providing breathing space to put in place required adjustment policies). But not so long that it unduly penalises creditors. This suggests that the length of the maturity extension should match that of typical official sector support programmes. The typical length of an IMF programme is around three years.
Bonds covered	All sovereign and sovereign-guaranteed debt (bonds and loans) would include this clause. However, Treasury bills with an original maturity of one year or less would be excluded, since they are typically excluded from debt restructurings.
Coupon payments	If a maturity extension is triggered, coupon payments for each bond will continue at their original level and frequency. 'Amortising bonds' – and other debt instruments that repay the face value in instalments – would have the principal (but not coupon) payments postponed for the length of the maturity extension.
Number of maturity extensions	The maturity extension clause can only be activated once. Therefore, a country which takes several consecutive support programmes would not benefit from multiple maturity extensions. However, any sovereign cocos issued after the trigger event would be unaffected – these could be triggered in the normal way.

3.1 The benefits of sovereign cocos

How would sovereign cocos, in principle, improve current arrangements?

First, sovereign cocos will enhance market discipline of sovereign debtors. Creditors could no longer anticipate full repayment by the official sector in times of crisis. This would reduce the incentive to lend incautiously to sovereigns, thus helping to mitigate moral hazard. Over the medium term, this should contribute to reducing the incidence of sovereign debt crises.

At present, the official sector suffers from a time-inconsistency problem. The incentive for policy-makers, in normal times, is to commit to a framework that encourages private sector involvement (PSI), in order to discourage moral hazard. But this is often very difficult to impose

[4] CACs are clauses in sovereign bond contracts that bind minority 'hold-out' creditors into a debt restructuring deal agreed between the debtor and a qualified majority of consenting creditors.

ex post, once a crisis has begun. This is because in the midst of a crisis, PSI, if unexpected by creditors, risks causing contagion. Therefore, any non-binding *ex-ante* commitment by the official sector to impose PSI often lacks credibility. Because the maturity extension would occur automatically with sovereign cocos, the commitment to bail-in creditors would be much more credible than the current system.

Second, by maintaining the exposure of existing creditors, rather than transferring it to the official sector, any subsequent debt writedowns would involve a greater proportion of the sovereign's pre-crisis creditors. The burden of the debt writedown will be more equitably distributed amongst creditors and should involve smaller haircuts on each bond to restore debt sustainability. This should reduce the current bias for creditors to increasingly prefer to only lend short term to a sovereign facing mounting financing pressures.

Third, the activation of sovereign cocos would significantly alter burden-sharing between private creditors and the official sector/taxpayers, reducing the required size of official sector emergency loans. Official sector liquidity assistance would not have to cover debt amortisation payments. It would, however, need to provide lending to cover the fiscal deficit and any off-balance-sheet liabilities such as bank recapitalisation.

The benefits are clear in the case of Greece. If the maturity of Greece's sovereign bonds had been extended ahead of its IMF/EU programme, this would have significantly reduced the size of official sector support from €110 billion to less than €45 billion. By reducing the size of official sector intervention, sovereign cocos could significantly reduce the risk to global taxpayers and make it easier to negotiate a debt restructuring in the event of insolvency.

3.2 Potential constraints

While the theoretical benefits of sovereign cocos are relatively clear, there may be a number of practical constraints. This section addresses some of the objections that might be raised.

Could sovereign cocos increase the incidence of liquidity crises?

If investors anticipate an automatic maturity extension in times of crisis, they may become more 'flighty', causing interest rates to increase and become more volatile. Could this increase the incidence of liquidity crises?

It is likely that the price of debt containing sovereign cocos would be more sensitive to changes in the sovereign's economic fundamentals. In particular, if a shock hits and investors anticipate that an official sector bailout is likely, yields would jump up. As a first approximation, this yield increase should be similar to the term premium on a bond that has an additional three-year maturity. If correct, this would be unlikely to have significant implications for the sovereign or its creditors over the short term.

Any increase in interest rate sensitivity would reflect a risk transfer from the official sector to the private sector. Such a change should be viewed as desirable since it would foster greater market discipline, incentivising sovereigns to reduce debt levels and improve the resilience of their balance sheet. Over the longer term, therefore, it is not clear that interest rates would be permanently higher or more volatile.

Furthermore, the lesson from the introduction of CACs is that such considerations have not been a concern. CACs share some features of sovereign cocos – they are used to facilitate debt restructurings and are stipulated into bond contracts at issuance. Becker, Richards and Thaicharoen (2003) and Gugiatti and Richards (2003) find no difference in cost of bonds with and without CACs.

Sovereign cocos are clearly more ambitious than CACs, but the evidence suggests that policies designed to facilitate debt restructuring may not be excessively expensive, especially for sovereigns with relatively sound fundamentals.

What if the sovereign is insolvent?

Sovereign cocos are unlikely to resolve solvency problems. History suggests that a sizable reduction in interest and/or principal payments is often required to achieve this. But the activation of sovereign cocos in the case of an insolvent sovereign can still play a beneficial role.

Often at the outset of a crisis it is very difficult to assess the solvency position of a sovereign. In some cases it may take some time to determine whether a sovereign has the capacity to repay its debt. A key advantage of sovereign cocos is that they can buy time to make a fuller assessment of debt sustainability and, if need be, to undertake debt restructuring negotiations in an orderly way.

Another important benefit of sovereign cocos is that they would ensure that creditors across the maturity spectrum remain liable for any future debt writedown. This reduces the current bias whereby short-term creditors are almost always rescued by the official sector, and longer-term creditors (or worse, taxpayers) take on the crisis country sovereign's entire credit risk.

Is official sector lending the best trigger? In principle, the maturity extension in the sovereign coco could be triggered in a number of ways. The 'Universal Debt Rollover Option with a Penalty' (UDROP) proposal by Buiter and Sibert (1999) advocates that all foreign currency-denominated liabilities include a maturity extension option. Under this proposal, the maturity extension can be exercised at the discretion of the debt issuer when it is faced by excessive market pressure. Another idea could be to link the trigger mechanism to market interest rates, so the maturity extension occurs when marginal yields exceed a certain threshold.

While these alternative mechanisms deserve further consideration, a trigger linked to official sector lending seems to most closely target the fault lines described above. In particular, the private sector is required to share the burden of crisis resolution at the same time as the official sector provides support.

Should short-term debt also contain the maturity extension clause?

The exclusion of Treasury bills is justified by the important role that these instruments play in providing liquidity to the financial sector, and as a means for the government to raise cash during crisis situations. As a result these instruments have historically been excluded from sovereign debt restructurings. However, the downside of this is that it may reduce the relative cost of short-term debt, leading to greater short maturity debt issuance, and increased vulnerability of the sovereign.

If, however, a government were to shift the composition of its debt issuance to be predominantly short-term Treasury bills, it would send a clear warning to market participants about its increasing vulnerabilities. We think the market would provide a disciplinary force against extreme and imprudent changes in maturity composition of sovereign debt issuance.

What happens if a country cannot regain market access after three years?

In most cases, three years should be enough time to regain market access (in the case of a liquidity crisis) or to conclude that a country requires a debt writedown (in the case of a solvency crisis). But it is possible that a country may not be able to regain market access after three years, but still wish to repay its debts. In this case, the sovereign should use the time provided by the sovereign cocos to negotiate a further maturity extension – but this would be without the automaticity of the maturity extension clause embedded in the sovereign coco.

Should the trigger be activated for all types of IMF support package?

Some types of IMF programme assistance should not be used as triggers for sovereign coco clauses. For instance, long-term concessional poverty-reduction programmes, which can be provided even when there is no immediate balance-of-payments need or sovereign debt crisis, should be exempt. In addition, when a sovereign draws down upon an IMF Flexible Credit Line (FCL) – and perhaps a Precautionary Liquidity Line (PLL) – it would be inappropriate for the trigger to be activated. The reason for this is that these facilities are designed for crisis prevention. FCL and PLL resources are meant to be accessible by a country at any time, even when they have access to private capital markets. If a drawdown on FCL resources were to trigger an automatic maturity extension of sovereign debt, it would undermine the differentiation between the IMF's crisis prevention and crisis resolution facilities and reduce the incentives for countries to apply for an FCL or PLL.

Would activation of the clause trigger CDS?

It would be for the International Swaps and Derivatives Association (ISDA) to determine whether or not the activation of a sovereign coco maturity extension would trigger payouts on credit default swap (CDS) contracts. In principal, activation of the maturity extension should not represent a breach of contract since the terms for such a maturity extension would have been set out in the bond contract. In practice, however, it is possible that CDS contracts might evolve to explicitly provide a CDS payout in the event of a sovereign coco maturity extension. If this were to be the case, it would provide a means for private creditors to better insure themselves against a maturity extension.

How might sovereign cocos be valued on bank balance sheets?

Sovereign debt incorporating cocos that are held by banks for trading purposes would be re-valued to their market price on an ongoing basis, thus capturing changes in the market's

view of the probability of a trigger event immediately in their profit and loss. However, there would likely need to be some change in the regulatory treatment of sovereign debt cocos that are intended to be held by banks to maturity. It is likely that there would need to be an impairment charge against the value of these bonds at the point where a maturity extension trigger became probable.

Box 2: *Ex-Post* Debt Rollovers

An alternative to introducing automatic maturity extensions into bonds might be to promote voluntary debt rollovers after a crisis hits – an *ex-post* rather than *ex-ante* solution. In this scenario, when a sovereign loses or risks losing market access, it would meet with its creditors to negotiate a maturity extension. In practice, this might occur via a formal bond swap (with longer maturity bonds) or a commitment by creditors to reinvest the proceeds of maturing bonds and loans into new debt.

This type of strategy has had some success in the past. The European Bank Coordination 'Vienna Initiative' was launched during the recent crisis to help prevent self-fulfilling liquidity crises in Central and Eastern European financial institutions. Made up of the major credit institutions lending to the region, this group agreed to maintain credit provision in order to avoid damaging cross-border deleveraging. De Haas *et al.* (2012) find evidence that the 'Initiative' was successful at achieving this objective.

A similar strategy was also used in Korea in late 1997, when the IMF and it largest shareholders helped to coordinate a voluntary rollover of Korean banking sector debt. The Independent Evaluation Office (2003) concludes that this action was 'at least as useful in resolving the crisis as...providing or mobilizing financial resources'. A similar bank debt rollover operation was also undertaken in Turkey in 2000.

In the early 1980s, coordinated sovereign debt maturity extensions on the bank loans to many Latin American countries were agreed. Here the role of the IMF and other official and bilateral creditors was to support new borrowing, but crucially not to fund debt rollovers. Ultimately, this strategy was not enough to solve the crisis, and large debt writedowns were eventually needed. But this did mean that the official sector held a much smaller proportion of the sovereign debt than was the case for many subsequent bailouts.

Given the relatively successful experience with voluntary *ex-post* rollovers of private debt, why hasn't this approach been used more frequently for sovereign crisis resolution?

The main reason for this is likely to be that present-day sovereigns are much more reliant on bond finance as opposed to loans from banks. This implies a much larger and more dispersed investor base, which makes it much harder to coordinate a voluntary debt rollover. Often in the midst of a crisis, policy-makers simply do not have the time available to identify and bring together the sovereign's large number of bondholders, and then undertake debt rollover negotiations. And, experience has shown that bond restructurings are more susceptible to problems relating to hold-out creditors which complicates, and often lengthens, the negotiation process.

Another factor is that markets have learnt to anticipate IMF lending support. In order for a voluntary rollover to work, there must be a credible threat that without this, the sovereign will unilaterally restructure its debt. But, in some cases, the contagion and spillover costs to the rest of the world mean that the official sector would not allow this to happen. Therefore, this threat of unilateral action is not credible; this, in turn, reduces the likelihood that private sector creditors would agree to a voluntary debt rollover.

Therefore, while voluntary *ex-post* sovereign debt rollovers may be desirable in principle, they are hard to achieve in cases where the majority of a sovereign's debt is in the form of traded bond instruments. Sovereign cocos would allow maturity extensions without encountering the problems described above. The maturity extension occurs automatically, without needing to identify or negotiate with any of the bondholders. Furthermore, because the clauses are included in bond contracts at issuance, there is much more certainty that the maturity extensions would occur in the event of a crisis. Greater credibility and *ex-ante* certainty is therefore built into the system.

4. GDP-linked bonds

The second state-contingent asset that we think deserves greater attention is 'GDP-linked bonds'. GDP-linked bonds provide a natural complement to sovereign cocos – while sovereign cocos are primarily designed to tackle liquidity crises, GDP-linked bonds help reduce the likelihood of solvency crises. And both are state-contingent instruments, which can be defined in bond contracts at issuance.

In what follows, we assume that GDP-linked bonds include the following features: first, the bond's principal would be directly indexed to nominal GDP; and second, the coupon on this bond is paid as a fixed proportion of this principal, and therefore also varies with nominal GDP.

GDP-linked bonds are not a new idea. Shiller (1993, 2003) argues that these bonds would allow households and companies to take an 'equity stake' in a country's economic performance, helping risk diversification and hedging. Barro (1995) focuses on the benefits to the government – in particular, the ability to use GDP-linked bonds as a means to smooth taxes through time. Others, including Chamon and Mauro (2005) and Ruban, Poon and Vonatsos (2008) demonstrate how GDP-linked bonds can reduce the credit risk on sovereign debt.

GDP-linked bonds can reduce the likelihood of sovereign default through two related means. First, they reduce the size of increases in sovereign debt related to contractions in GDP. Second, GDP-linked bonds can raise the maximum sustainable debt level of the sovereign, providing countries with more 'fiscal space' in times of crisis. Each property will be explored in turn.

4.1 Stabilising debt

The evolution of a sovereign's debt-to-GDP ratio is determined by two broad categories of shocks: i) 'spending shocks', made up of shocks to the structural primary balance and interest payments; and ii) 'growth shocks', which covers GDP growth out-turns (affecting the denominator of the debt/GDP ratio) and the corresponding impact on the cyclical component of the primary balance.

GDP-linked bonds cannot prevent debt accumulating to dangerous levels as a result of spending shocks. Therefore, there is still a risk that governments may over-borrow, which could lead to unsustainable debt levels. But because GDP-linked bonds provide a return to creditors that varies in proportion to the debtor country's nominal GDP growth, they can reduce the risks faced by the sovereign from growth shocks. This provides a form of recession insurance to the sovereign, and reduces the risk that growth shocks will push a sovereign into default.

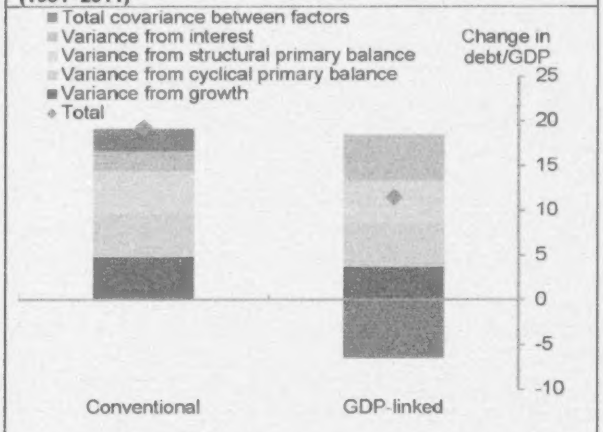
To illustrate this, the left-hand column of **Chart 5** shows the variance of changes in debt to GDP of G7 economies over the period 1991–2011. This is decomposed into the various factors that determine the evolution of the debt-to-GDP ratio – interest payments, GDP growth, the primary balance (structural and cyclical components), and the covariance between these factors. Note that the cyclical primary balance is inversely correlated with growth, as automatic stabilisers engage when growth is weaker.

The left-hand bar shows that nominal GDP growth plays an important role in determining the evolution of the debt-to-GDP ratio. In fact, around half of the variance of the G7 countries' sovereign debt-to-GDP ratios can be accounted for by 'growth shocks' (the combined variance of growth and the cyclical primary balance).

The right-hand column of **Chart 5** shows the reduction in variance that would have been achieved over this period if the G7 economies had issued GDP-linked bonds covering the entirety of their debt issued. This reduction is driven by the negative relationship between the interest payments on GDP-linked bonds and growth. This is illustrated in the high negative covariance bar in blue.

In these simulations, GDP-linked bonds reduce the variance of changes in the debt-to-GDP ratio by over 40%. This reduces the likelihood that recessions will force a country to default on its debt. It also allows greater scope for governments to use countercyclical fiscal policy to stabilise growth.

Chart 5: Debt-to-GDP variance decomposition in G7 countries (1991–2011)



Sources: Consensus Forecasts, IMF *World Economic Outlook* and authors' calculations

4.2 Increasing 'fiscal space'

Under realistic pricing assumptions (see section 4.3), GDP-linked bonds can also increase the sovereign's capacity to maintain higher debt levels without coming under market pressure.

What is the intuition behind this? As sovereign debt increases and market participants become more concerned about the possibility of a default or debt restructuring, the yield demanded by investors to hold sovereign debt rises (this is distinct from the GDP risk premium, discussed next). The size of this credit spread will depend on the size of potential shocks to the debt-to-GDP ratio; i.e., the probability that the sovereign may be hit with a big enough shock to push it into default.

As illustrated above, the debt-to-GDP ratio is much less volatile for sovereigns with GDP-linked bonds than conventional debt. Therefore, at any given debt level, the probability that a sovereign will breach its debt limit is lower for GDP-linked bonds than that for conventional bonds. This implies a lower credit spread at any given debt level. And this has the effect of raising the debt limit.

An example may help to clarify this. Assume a sovereign has run up high debt levels from overspending and is approaching its debt limit. There is uncertainty over future growth – if growth is at trend, then the sovereign is likely to repay all of its debts; but if a recession occurs, then the sovereign is likely to default with large deadweight costs to both creditors and the debtor.

With conventional bonds, investors price in the risk of this high probability of default and charge a higher credit spread. This makes the sovereign's debt-servicing burden even worse, moving the country closer to default. But if the country has GDP-linked bonds, its debt-to-GDP ratio will be less affected by a fall in GDP growth – the sovereign has already purchased 'recession insurance'. Investors recognise this lower risk, and charge a lower credit spread, improving the ability of the sovereign to withstand shocks and thus raising the overall debt limit.

The automatic stabilisation provided by GDP-linked bonds reduces the likelihood that the sovereign would need to resort to debilitating fiscal consolidation in the depths of a crisis in order to control debt dynamics.

This analysis does not, however, consider how sovereigns' behaviour may change – in particular the risk that governments may simply scale up borrowing.

While all countries might experience some benefit from the use of GDP-linked debt, economies with higher GDP growth volatility (such as EMEs) or countries where monetary policy is constrained (such as those in a monetary union) are likely to benefit most.

In contrast, the benefits for economies that have debt denominated in local currency and have direct control over monetary policy will be smaller.

4.3 The cost of GDP-linked bonds

GDP-linked bonds shift some of the risks associated with poor growth out-turns from the sovereign to its creditors. Reflecting this, it is likely that investors would demand to be compensated for taking on this additional risk. Therefore, the sovereign would need to pay an additional 'GDP risk premium' (much like an equity risk premium) to compensate for the risk of this uncertain return. If this premium is very high, then the impact on sovereign debt servicing could be so large that the debt limit of the sovereign may actually be lower than with conventional bonds.

Kamstra and Shiller (2009) use a capital asset pricing model (CAPM) to estimate a risk premium of 150 basis points on a GDP-linked bond for the United States. And Borensztein and Mauro (2004) estimate an average risk premium of 100 basis points for EMEs. Both papers argue that this cost is small compared to the benefits of GDP-linked bonds.

4.4 Why don't sovereigns currently issue GDP-linked bonds?

The theoretical case in favour of issuing GDP-linked bonds appears strong. So why is it that no sovereign has yet issued a 'plain vanilla' GDP-linked bond?[5]

A common criticism[6] is that governments may have an incentive to misreport GDP to reduce interest payments. While this is a risk, this is also a problem faced with inflation-linked bonds, yet these are issued in many countries. Just as sovereigns need to build credibility not to writedown or inflate away their debt, so too countries would need to build credibility not to misreport their GDP data. Those countries that cannot demonstrate this credibility would be charged a higher yield on their debt.

Another potential constraint is that GDP data are often revised after the initial release. **Chart 6** shows revisions in UK data from the initial release data to the latest estimate. Over this period the absolute mean error is 1.0 percentage point. Part of these revisions has been due to methodological changes.

One way to mitigate this problem would be for the interest and principal payments to be based on lagged data (say, six months); after this time, subsequent revisions would have no effect on the coupon and principal payments of the GDP-linked bonds. Even if the data used to calculate the return on GDP-linked bonds do not always match the most recent best estimate, they can still provide valuable recession insurance for a sovereign. This is illustrated in **Chart 6**, which shows that recessions are relatively well identified in early-release GDP figures.

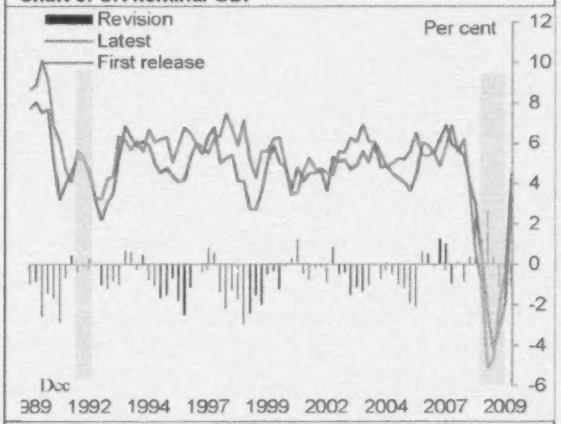
Survey data collected by Griffin (2012) suggest that while buy-side investors realise the benefits of GDP-linked bonds in reducing sovereign default risk, they are still viewed as more risky than conventional debt. However, this risk is not due to the inherent characteristics of the instrument itself. Instead, investors are concerned about the misreporting of GDP data and regulatory uncertainty.

[5] A number of governments, such as Argentina, Bulgaria and Greece, have issued GDP warrants. These provide an additional interest return if GDP growth out-turns are higher than a pre-defined level. But while they provide an upside return on growth, they do not include a symmetrical discount if growth is poor. These bonds, therefore, do not give the sovereign the recession insurance provided by GDP-linked bonds.

[6] Borensztein and Mauro (2004) consider a number of potential problems with GDP-linked bonds, and seek to counter them.

Respondents thought that these risks could be mitigated if a respected independent body monitored and enforced data integrity, and a model contract with standard legal provisions could be developed. Furthermore, some thought that the demand for GDP-linked bonds would be higher if several EMEs issued them at the same time. Thus, one way to help address these problems is through international coordination.

Chart 6: UK nominal GDP



Note: The data end in 2009 so that all data have been through the Office for National Statistics balancing process at least twice. Recession bars are shaded in grey.
Source: Office for National Statistics

5. The case for international coordination

The previous analysis suggests that while there may be some practical constraints to the issuance of sovereign cocos and GDP-linked bonds, the net benefits are likely to be material. Allen and Gale (1994) and Borensztein and Mauro (2004) consider a number of reasons why socially beneficial financial instrument innovations may sometimes not be introduced. These include: i) the inability to coordinate to reach a critical mass of issuance required to achieve sufficient market liquidity; ii) initial uncertainty over how to value these instruments; iii) high initial costs to designing the instruments and creating a trading platform; and iv) the need for common standards to minimise operational uncertainty.

One way to overcome some of these first-mover considerations would be for interested sovereigns to coordinate their issuance of sovereign cocos and/or GDP-linked bonds. Such a collective effort would facilitate the development of the market infrastructure and standards to support these instruments.

An example of this type of international coordination was the promotion of CACs by the G10 following the Asian crisis. Prior to 2003, CACs had been common in bonds issued under English law, but the majority of EME foreign bonds were issued under New York law and did not contain CACs.

At the time, EME sovereigns were reluctant to individually include CACs in their bonds, out of fear that it would be interpreted as a negative signal about their likely need for a sovereign debt restructuring and therefore raise borrowing costs. There were also concerns about a possible increase in the liquidity premium on the initially small pool of bonds with CACs.

To help overcome this first-mover problem, in early 2003, G10 economies committed to include CACs in their foreign currency-denominated debt. Following this, Mexico issued the first EME sovereign bond which contained a CAC under New York law (Drage and Hovaguimian 2004).

If countries with both strong and weaker fiscal positions were to decide to introduce these contractual modifications to their sovereign bonds, it would remove the first-mover problem and also send a strong signal that all countries recognise the global benefits of reducing the incidence of sovereign debt crises.

It is worth highlighting that CACs were introduced during a period of benign economic conditions, when sovereign default was not a major worry for creditors. Given the current elevated market concerns regarding the solvency of some euro-area sovereigns, the current juncture seems a less propitious time to begin issuing sovereign cocos and GDP-linked bonds. However, this does not mean that now is not the time to begin considering these types of reforms.

If sovereigns were to begin issuing sovereign cocos and GDP-linked bonds, it seems most likely that these would be introduced gradually as existing debt matures, rather than by converting all debt at once (for instance, by using retroactive legislation or as part of a debt exchange). Advanced and emerging markets have an average residual debt maturity of around six and eight years, respectively (IMF 2013a). This suggests that it may take some years before the benefits of these instruments can be fully realised. This highlights that these instruments are designed to tackle future crises, rather than addressing current problems.

6. Conclusion

Events over the past few years have demonstrated to policy-makers and market participants that advanced economy sovereign debt is not immune to liquidity and solvency crises. Consequently, there are significant strains on the current international toolkit for crisis resolution.

One particular weakness of the current arrangements is an overreliance on international emergency liquidity assistance to tackle sovereign debt crises. Such reliance risks promoting moral hazard, incentivising short-term debt issuance, jeopardising taxpayer resources, complicating voluntary debt restructuring, and encouraging sovereigns to delay reform. This paper argues that there are changes that could be made to sovereign debt contracts that would help to reduce the likelihood of sovereign debt crises in all countries and improve the burden-sharing between the official sector and private creditors when such crises do occur.

Promoting greater private sector risk-sharing – as currently being targeted in banking sector reform – should be pursued for sovereign debt. Contractual reforms offer a means to improve the crisis resolution toolkit in a way that is transparent and more predictable to the market.

Our proposed formulation of sovereign cocos is primarily designed to help tackle sovereign liquidity crises. They would automatically extend the maturity of bonds when a sovereign borrows from the official sector. This has the effect of: i) significantly reducing the size of official sector support packages (better safeguarding taxpayer resources and making voluntary debt restructurings easier to agree); ii) better incentivising market discipline by reducing the risk of moral hazard; and, iii) making private sector bail-in more predictable and credible.

GDP-linked bonds provide a natural complement to sovereign cocos, as these help to reduce the likelihood of solvency crises. By linking the return of a bond to nominal GDP – and therefore indirectly to a government's ability to pay – they provide a form of recession insurance. They reduce the volatility of a sovereign's debt-to-GDP ratio, as well as increasing its fiscal space.

A common, and legitimate, question often raised when discussing these types of debt instruments is: if they are such a good idea, why haven't they been introduced already? A

number of potential concerns are explored in this paper. We think it will be possible to address these concerns through careful design of the contractual arrangements.

It seems likely that international co-operation will be needed to introduce these instruments. This will help overcome concerns about possible first-mover disadvantages of issuing such debt. Just as with CACs, progress on implementing these changes to bond contracts would be facilitated by an international agreement, both to issue this debt (thus reducing concerns relating to liquidity and stigma) and to collectively invest in the infrastructure and institutions required to support the debt.

While we recognise the possible risks of introducing these instruments in the present climate, these issues need to be discussed and addressed now in order to build confidence that the next sovereign debt crisis can be resolved in a less costly manner.

References

AFD (2009) "Le Prêt Très Concessionnel Contrat-cyclique de l'AFD (PTCC)." Available at http://www.afd.fr/webdav/shared/PORTAILS/PAYS/PORTAIL_BF/PDF/PTCC.pdf.

Allen, F. and Gale, D. (1994) *Financial Innovation and Risk Sharing*. Cambridge, MA: MIT Press.

Barkbu, B., Eichengreen, B. and Mody, A. (2011) "International Financial Crises and the Multilateral Response: What the Historical Record Shows." NBER Working Paper No. 17361.

Barro, R. (1995) "Optimal Debt Management." NBER Working Paper No. 5327.

Becker, T., Richards, A. and Thaicharoen, Y. (2003) "Bond Restructuring and Moral Hazard: Are Collective Action Clauses Costly?" *Journal of International Economics* 61 (1): 127–61.

Borensztein, E. and Mauro, P. (2004) "The Case for GDP-Indexed Bonds." *Economic Policy* 19 (38): 165–216.

Buiter, W. and Sibert, A. (1999) "UDROP: A Contribution to the New International Financial Architecture." *International Finance* 2 (2): 227–47.

Chamon, M. and Mauro, P. (2005) "Pricing Growth-Indexed Bonds." IMF Working Paper No. WP/05/216.

Cole, H. and Kehoe, T. (2000) "Self-Fulfilling Debt Crises." *Review of Economic Studies* 67 (1): 91–116.

Committee on International Economic Policy and Reform (2013) "Revisiting Sovereign Bankruptcy." Brookings Institution.

Corsetti, G., Guimaraes, B. and Roubini, N. (2003) "International Lending of Last Resort and Moral Hazard: A Model of IMF's Catalytic Finance." NBER Working Paper No. 10125.

Cruces, J. and Trebesch, C. (2013) "Sovereign Defaults: The Price of Haircuts." *American Economic Journal: Macroeconomics*. Forthcoming.

De Haas, R., Korniyenko, Y., Loukoianova, E. and Pivovarsky, A. (2012) "Foreign Banks and the Vienna Initiative: Turning Sinners into Saints." European Bank for Reconstruction and Development Working Paper No. 143.

De Paoli, B., Hoggarth, G. and Saporta, V. (2009) "Output Costs of Sovereign Crises: Some Empirical Estimates." Bank of England Working Paper No. 362.

Drage, J. and Hovaguimian, C. (2004) "Collective Action Clauses (CACS): An Analysis of Provisions Included in Recent Sovereign Bond Issues." Bank of England Financial Stability Review, November.

Dreher, A. (2004) "Does the IMF Cause Moral Hazard? A Critical Review of the Evidence." Available at http://ssrn.com/abstract=505782.

Gai, P. and Taylor, A. (2004) "International Financial Rescues and Debtor-Country Moral Hazard." Bank of England Working Paper No. 217.

Ghezzi, P. (2012) "Official Lending: Dispelling the Lower Recovery Value Myth." VOX, available at http://www.voxeu.org/article/official-lending-dispelling-lower-recovery-value-myth.

Gitlin, R. and House, B. (2013) "The Sovereign Debt Forum: Expanding our Tool Kit for Handling Sovereign Crises." CIGI Policy Brief No. 28. Available at http://www.cigionline.org/sites/default/files/CIGI_PB_28.pdf.

Griffin, S. (2013) "Growth-Linked Bonds: EMTA Institutional Investor Questionnaire." Slaney Advisors Limited, available at http://www.emta.org/newdev.aspx.

Gugiatti, M. and Richards, A. (2003) "Do Collective Action Clauses Influence Bond Yields? New Evidence from Emerging Markets." Reserve Bank of Australia Discussion Paper No. 2003-02.

Haldane, A. and Alessandri, P. (2010) "Banking on the State." Available at http://www.bankofengland.co.uk/publications/Documents/speeches/2009/speech409.pdf.

Haldane, A. and Kruger, M. (2001) "The Resolution of International Financial Crises: Private Finance and Public Funds." Available at http://www.bankofengland.co.uk/publications/Documents/other/financialstability/boeandboc.pdf.

Haldane, A. and Scheibe, J. (2004) "IMF Lending and Creditor Moral Hazard." Bank of England Working Paper No. 216.

Independent Evaluation Office (2003) "The IMF and Recent Capital Account Crises: Indonesia, Korea, Brazil." International Monetary Fund. Available at http://www.imf.org/external/np/ieo/2003/cac/.

International Monetary Fund (2007) "Fund Financial Support and Moral Hazard: Analytics and Empirics." Available at http://www.imf.org/external/np/pp/eng/2007/030207.pdf.

International Monetary Fund (2012) "The Good, the Bad, and the Ugly: 100 Years of Dealing with Public Debt Overhangs." *World Economic Outlook*, October, Chapter 3, pp. 101–27.

International Monetary Fund (2013a) "IMF Fiscal Monitor – Fiscal Adjustment in an Uncertain World." April.

International Monetary Fund (2013b) "Sovereign Debt Restructuring – Recent Developments and Implications for the Fund's Legal and Policy Framework." Available at http://www.imf.org/external/np/pp/eng/2013/042613.pdf.

Kamstra, M. and Shiller, R. (2009) "The Case for Trills: Giving the People and Their Pension Funds a Stake in the Wealth of the Nation." Cowles Foundation Discussion Paper No. 1717.

Krueger, A. (2002) "A New Approach to Sovereign Debt Restructuring." International Monetary Fund. Available at http://www.imf.org/external/pubs/ft/exrp/sdrm/eng/sdrm.pdf.

Lane, P. and Milesi-Ferretti, G. (2007) "The External Wealth of Nations Mark II: Revised and Extended Estimates of Foreign Assets and Liabilities, 1970–2004." *Journal of International Economics* 73 (2): 223–50.

Mody, A. (2013)"Sovereign Debt and its Restructuring Framework in the Eurozone." Forthcoming.

Murphy, G., Walsh, M. and Willison, M. (2012) "Precautionary Contingent Capital." Bank of England Financial Stability Paper No. 16.

Mussa, M. (1999) "Reforming the International Financial Architecture: Limiting Moral Hazard and Containing Real Hazard." In D. Gruen and L. Gower, eds., *Capital Flows and the International Financial System*, 216–36. Proceedings of a conference held by the Reserve Bank of Australia.

Mussa, M. (2004) "Reflections on Moral Hazard and Private Sector Involvement in the Resolution of Emerging Market Financial Crises." In A. Haldane, ed., *Fixing Financial Crises in the Twenty-first Century*, 33–51. London: Routledge.

Reinhart, C. and Rogoff, K. (2008) "This Time is Different: A Panoramic View of Eight Centuries of Financial Crises." NBER Working Paper No. 13882.

Ruban, O., Poon, S., and Vonatsos, K. (2008) "GDP Linked Bonds: Contract Design and Pricing." Available at http://ssrn.com/abstract=966436.

Schwartz, A. (1998) "Time to Terminate the ESF and the IMF." Cato Foreign Policy Briefing No. 48.

Shiller, R. (1993) *Macro Markets: Creating Institutions for Managing Society's Largest Economic Risks*. Oxford: Oxford University Press.

Shiller, R. (2003) *The New Financial Order: Risk in the 21st Century*. Princeton: Princeton University Press.

Standard and Poor's (2013) "Sovereign Defaults and Rating Transition Data, 2012 Update." Available at https://www.globalcreditportal.com/ratingsdirect/renderArticle.do?articleId=1106307&SctArtId=147645&from=CM&nsl_code=LIME.

Weber, A., Ulbrich, J. and Wendorff, K. (2011) "Safeguarding Financial Market Stability, Strengthening Investor Responsibility, Protecting Taxpayers: A Proposal to Reinforce the European Stability Mechanism through Supplementary Bond Issuance Terms." Deutsche Bundesbank. Available at http://www.bundesbank.de/Redaktion/EN/Kurzmeldungen/Current_issues/Archive/2011_03_03_european_stability_mechanism.html.

Zettelmeyer, J., Trebesch, C. and Gulati, M. (2013) "The Greek Debt Restructuring: An Autopsy." Peterson Institute for International Economics Working Paper No. 13-8. Available at http://www.iie.com/publications/wp/wp13-8.pdf.